

CLAIMS:

1. A production method of an SiC monitor wafer having an ultra-flat and clean surface comprising the steps of:
 - 5 depositing SiC of crystal system 3C on a substrate by a CVD (Chemical Vapor Deposition) method;
 - detaching the SiC from the substrate;
 - flattening the SiC surface by using mechanical polishing alone or in combination with CMP (Chemo Mechanical Polishing);
 - 10 thereafter, irradiating the surface with GCIB (Gas Cluster Ion Beam) until the surface roughness becomes $R_a = 0.5 \text{ nm}$ or less, and impurity density of the wafer surface becomes $1 \times 10^{11} \text{ atoms / cm}^2$ or less to thereby produce the SiC monitor wafer.
- 15 2. The production method of the SiC monitor wafer according to claim 1, wherein:
 - in the CVD process, 3C-SiC crystal is oriented and grown in a direction of [100] or [110] or [111], and crystal orientation is made uniform, whereby etching rate anisotropy is avoided at the time of CMP and GCB
 - 20 irradiation.
3. The production method of the SiC monitor wafer according to claim 1, wherein:
 - 25 in the machining step in which mechanical polishing is solely used or used in combination of CMP before the GCIB is irradiated, the surface roughness (PV value) in an area of $100 \text{ } \mu\text{m}$ of the wafer surface is flattened

to 5 nm to 50 nm, and thereafter an ultra-flat surface is produced by the GCIB.

4. The production method of the SiC monitor wafer according to claim
5 1, wherein:

when mechanically polishing the SiC surface, a C surface of the 3C-SiC crystal is made a surface to be polished, and a larger etching rate is obtained as compared with Si surface polishing.

- 10 5. The production method of the SiC monitor wafer according to claim 1, wherein:

when the SiC surface is irradiated with the GCIB, a C surface of the 3C-SiC crystal is made a surface to be irradiated, and a larger etching rate is obtained as compared with the Si surface irradiation.

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6. The production method of the SiC monitor wafer according to claim 1, wherein:

by using CF_4 , SF_6 , NF_3 , CHF_3 or O_2 alone or a mixture gas of them as a gas of GCIB which is irradiated to the wafer surface, F radical generated on
20 the surface is utilized to promote chemical reaction on the SiC surface and a large etching rate is obtained.

7. The production method of the SiC monitor wafer according to claim 1, wherein:

25 after etching is carried out by using CF_4 , SF_6 , NF_3 , CHF_3 and O_2 alone or a mixture gas of them as a gas of GCIB which is irradiated to the

wafer surface, Ar gas cluster is irradiated to ultra-flatten the surface.